

Friends of the Entomology Research Museum



Newsletter



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FERM: Friends of the Entomology Research Museum is a UCR campus sponsored support group whose membership is open to students, faculty, staff, and the general public. Annual dues are ten dollars. Membership privileges include the annual meeting, and other occasional meetings and events including field trips and lectures.

Newsletters Online!

Back issues of the FERM newsletter are now available for online viewing! They can be accessed at the following URL:

http://entmuseum.ucr.edu/join_us_ferm.htm

The FERM Newsletter is published approximately quarterly and contains articles written by FERM members. If you would like to submit an article, please send it as a Word/Wordperfect file using one of the following two methods: (1) an attachment via email to the editor (see below) or (2) a hard copy version on disk. Submissions will be published in the order they are received in accordance with space availability and relevancy to the FERM general readership. If you have questions please contact the FERM Newsletter editors:

euproserpinus@msn.com, or ballmer@ucr.edu

FERM ANNUAL MEETING

The Annual FERM meeting and Potluck Dinner will be held on February 23, a Saturday, at the U.C.R Entomology Bldg. foyer and large conference room.

Setup starts at 5:00pm

Dinner at 6:00

Lecture at 7:00

What to bring: something for yourself and 3 others. FERM will provide cups, plates, utensils, hot/cold drinks.

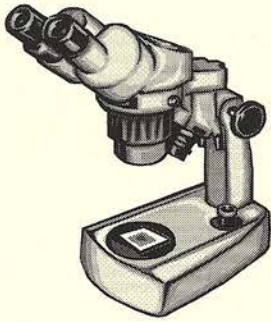
This meeting will see the installation of new officers, and we need people interested in helping to direct and lead FERM through the coming year and years.

Dr. Deborah K. Letourneau (Professor, U. C. Santa Cruz) will present our Keynote lecture.

For more info, contact Ken at Euproserpinus@msn.com or (951) 360-6461.

Mutualism, predation, and herbivory change rain forest biodiversity

Dr. Letourneau will be talking about a Costa Rican wet forest ant-plant system that she has been working on now for well over half her life-time. The project started small, in the 1970s and 80s, with only the notion of determining if the *Pheidole* ants and *Piper* plants were involved in a true mutualistic relationship. "My early work showed that the ants served as 'custodians' of the plants by removing vulnerable stages of herbivorous insects from the plant (dropping eggs off the side of the leaf to the forest floor) or consuming them. (Continued on page 3)



NEWS FROM THE MUSEUM

by Doug Yanega, Senior Museum Scientist

It's been a long time since our last newsletter, and a lot has been happening. Two of the most important things are quite recent. The first is that we have been awarded a grant (roughly \$50,000) by the Global Biodiversity Information Facility (GBIF) to database our bee collection over the next 16 months. The estimate is that we have around 150,000 specimens, and if about 500 specimens can be entered into the database each day, the entire holdings can be processed over this time. Hopefully, this will be very beneficial exposure for our collection in the growing "digital museum" community, and possibly open the door for similar projects in the future. The second significant development is that the ERM has been given a major material donation from the estate of the late Kenneth Cooper, UCR professor and a prolific insect collector/researcher, by his children Geoff and Tera. This includes a huge number of insect specimens, many of which are potter wasps, carabid beetles, cuckoo wasps, and bees, plus a large assortment of valuable entomological books and reprints, and some useful entomological equipment (particularly tools for micro-dissection and microscope slide preparation). It will take a long time to incorporate all of this into the ERM's collection and library, but it will be well worth the effort, and we'd like to express our gratitude for such a generous donation.

In other news, Peter Brabant picked up where Andy Ernst left off mounting specimens, and has also been doing an excellent job. James Gibson, who came to us via UCR's "transitional return-to-work" program, has been doing an exceptional job with the labeling, and making points for Peter to use for mounting. We had a number of curatorial visitors in the fall, including ex-grad-student Matt Buffington, who organized our Cynipoid holdings into excellent shape, and Brett Ratcliffe and Ron Cave, working on the Dynastine scarab beetles of Central America.

Got an idea for a FERM article???

Do you have anything buggy-related that might be of interest for the FERM newsletter? We really would be tickled pinkish if you would send "stuff" in to us. Remember, this newsletter won't have much in it unless we have material submitted from you folks that we can publish. Feel free to send in photos, articles, recent publications related to insect taxonomy or natural history and even stories about how the Entomology Research Museum has assisted you in your bug-related endeavors. Send them to euproserpinus@msn.com, preferably as attachments (not in email text). Additional information is on the front page of this newsletter.



(Letourneau lecture - Mutualism, continued from page 1)

However, the relationships among ants, herbivory, and plant fitness were elusive, and questions about pathogens and epiphylls emerged. The study has expanded as I've learned more, as theory has advanced, and as new interacting taxa have been added. As the mutualism questions were being resolved, the community of ant predators was emerging as a significant part of the story, forming a 4-trophic level system (at least)."

"The system has become a mesocosm for experiments on mutualism, but also herbivory, predation, plant defensive chemistry, and bottom-up and top-down cascading effects on plant and animal species richness in a complex rain forest community. In a recent paper, we have used evidence from this mesocosm to ask if the diversity found in a rain forest makes it a stable community or a fragile community (like a house of cards). Along the way, I have had fabulous opportunities to work in remote rain forest sites, I discovered a new species of clerid which is a facultative vegetarian, and I have gained a deep appreciation of scientific uncertainty (or the mystery and beauty of the natural world, as they say). This uncertainty obscures our ability to predict the impacts of human 'business as usual'."

The Collections of Ted Fisher

By Doug Yanega

Dr. Ted Fisher, whose endowment fund also is mentioned in this issue, is largely responsible for two significant specialized collections within the ERM. Most notable is the very large collection of Sciomyzidae ("snail-eating flies"), which occupies 35 drawers and contains approximately 25,000 specimens – an extraordinarily large amount for such a small (fewer than 600 species) and poorly-known family, and presumably one of the world's largest sciomyzid collections. Dr. Fisher, together with Bob Orth, described 10 species of sciomyzid flies: *Pteromicra siskiyouensis* Fisher & Orth, 1966; *Dictya frontinalis* Fisher & Orth, 1969; *Dictya zacki* Orth & Fisher, 1983; *Hoplodictya australis* Fisher & Orth, 1972; *Limnia lemmoni* Fisher & Orth, 1971; *Limnia sandovalensis* Fisher & Orth, 1978; *Sepedon capellei* Fisher & Orth, 1969; *Sepedon cascadiensis* Fisher & Orth, 1974; *Sepedon pseudarmipes* Fisher & Orth, 1969; and *Tetanocera arnaudi* Orth & Fisher, 1982. In addition, they collected substantial numbers of snails that were the hosts of the flies they studied, resulting in 5 drawers of snails housed along with the preservative collections in the ERM (see photo); all known species of Sciomyzidae are predators or parasites of molluscs, generally terrestrial or freshwater snails, but also some slugs and fingernail clams, or mollusc eggs. The Fisher & Orth snail collection is an exemplary use of vouchers in order to preserve data on important biological and ecological associations.

RECENT PUBLICATIONS BY FERM MEMBERS:

Clarke, O.F., D. Svehla, G.R. Ballmer, A. Montalvo. 2007. Flora of the Santa Ana River and Environs, with References to World Botany. Heyday Books, Berkeley, CA. 496 pp. (ISBN-13: 978-1-59714-050-8)

Vetter, R. S. and M. K. Rust. 2008. Refugia preferences by the spiders *Loxosceles reclusa* and *Loxosceles laeta* (Araneae: Sicariidae). J. Med. Entomol. 45(1): 36-41.

Triapitsyn, S.V., V.V. Berezovskiy, M.S. Hoddle, & J. G. Morse. 2007. A review of the Nearctic species of *Erythmelus* (Hymenoptera: Mymaridae), with a key and new additions to the New World fauna. Zootaxa 1641 1-64.

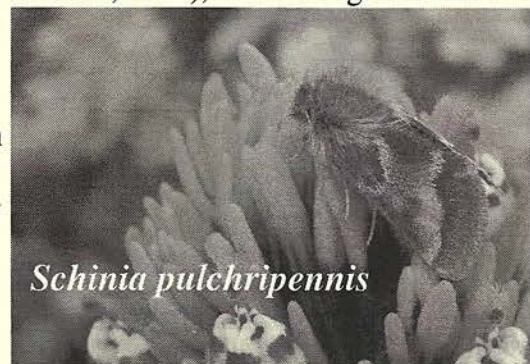
Triapitsyn, S.V. & V.V. Berezovskiy. 2007. Review of the Oriental and Australasian species of *Acmopolynema*, with taxonomic notes on *Palaeoneura* and *Xenopolynema* stat. rev. and description of a new genus (Hymenoptera: Mymaridae). Zootaxa 1455: 1-68.

Flower Moth Mania; the Heliothine Noctuids

by Mike Raschko and Ken Osborne

Between us, we have in excess of 50 years hard-core moth collecting experience. One of our favorite moth groups is the noctuid subfamily Heliothinae (flower moths), which we occasionally find at lights. The corn earworm moth (*Heliothis virescens*) and tobacco budworm (*Heliothis virescens*) are two common and familiar examples, which are also agricultural pests. Several less well known, but more colorful, species are diurnally active and can be found at flowers, especially of their larval host plants. Our interest in this noctuid subfamily has steadily intensified over the last several years after obtaining rare copies of a monograph on the group (*A Monograph of the North American Heliothentinae* by D.F. Hardwick, 1986), and we began to find ever more rare and specialized species.

Fifteen genera comprise the Heliothinae, three of these being monotypic. *Schinia*, the largest genus, is confined to North America and comprises approximately 150 of the approximately 170 species in the subfamily found in North America. Although some species occur transcontinentally, most are geographically restricted. A few diversity hot spots are southern California, southeastern Arizona, the southern plains (especially southern Texas), and northern Florida. Biology of the group characteristically involves high hostplant specificity (the few agricultural pest species being exceptions), oviposition into and larval use of the host reproductive structures (flowers & seeds), adult and larval crypsis among host flowers – causing many diurnal species to be gaudy and colorfully camouflaged among the host flowers, and close synchrony between moth biology and flowering of the hosts. Images depicting these photogenic moths will be presented at the annual FERM Pot-luck meeting, and one is featured in this newsletter's center insert.



Schinia pulchripennis

When adult *Schinia* are active, they are extremely wary, and flee at the click of a camera shutter, or sounds of the slightest footfall – even from twenty paces away. Those seeking to collect or photograph the diurnal species must learn to watch for them well ahead of one's path, then stealthily sneak up to get close. Alternatively, adults resting on flowers (usually hostplant blooms) may easily be approached and photographed on cool, cloudy days.

Several species of *Schinia* are found in the Wilson Valley area, south of Sage, Riverside Co. This area supports a chaparral-desert transition vegetation with high floral diversity and a succession of *Schinia* species from spring to fall. When winter rains are sufficient, spectacular early spring wildflower blooms bring out *Schinia pulchripennis* and *Schinia crotchi* in late February and March. As the season progresses, and the annual bloom intensifies, *Schinia aurantiaca*, *S. graefiana*, *S. sueta*, and *Heliothodes diminutiva* appear from mid-April through May.

Both *S. pulchripennis* and *S. crotchi* are diurnal and use owl's clover (*Castilleja excerta*) as a larval host. When resting on the colorful inflorescences of owl's clover, the pink and lavender forewings of *S. pulchripennis* provide effective crypsis. Despite its widespread distribution from Southern California to Southeastern Arizona, *S. aurantiaca* is often overlooked; Hardwick searched periodically for it over thirty years until a friend found a population within one hundred miles of his home in Wickenburg, AZ.



Heliothodes diminutiva

At Wilson Valley, *S. aurantiaca* may be found flying along ridge tops and nectaring on *Lasthenia*, but uses *Eriastrum* as its larval host. After a near-miss swing of the net, *S. aurantiaca* has the habit of dropping to the ground, where it is virtually invisible on the gravelly soil. *Schinia graefiana*, associated with *Chaenactis*, is another diurnal species that nectars at *Lasthenia*. This species is a rapid flyer and seems to disappear if you take your eye off of it for a second. Like many other heliothines, *S. graefiana* is only found in Southern California.

(Continued on page 5)

Schinia sueta is associated with various *Lupinus* species. *Schinia scarletina*, associated with *Stephanomeria*, may be found on the wing anytime from April to September – but only when the host is in bloom. Finally, in mid-September, two more *Schinia* species at this location can be attracted to the blacklight; these are *Schinia velaris* and *S. argentifascia*. *Schinia velaris* is found in association with *Lepidospartum squamatom*, its larval host. *Schinia argentifascia* is a species distributed all the way to West Texas, but we had previously only encountered it in the Eastern Mojave and montane areas of Southern Nevada. It is found in association with a Goldenbush species.

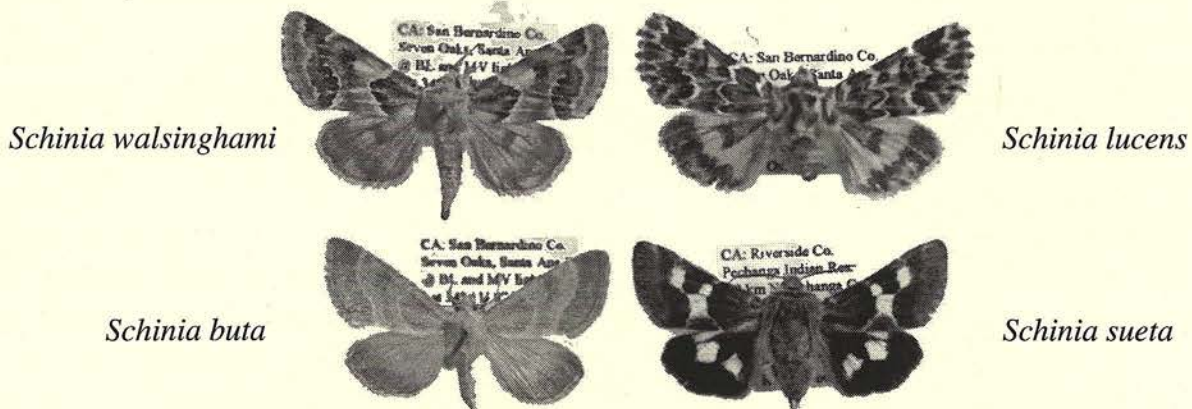
During California's record drought of 2007, moth collecting was often more productive out of state. Mike's interest in the Goblin Valley State Park area and the San Rafael Desert of Utah, was piqued by conversations with Doug Yanega, and cinched when he learned of the newly described *Schinia sanrafaeli* from the area. Other species such as *Schinia biundulata*, *Schinia meadi*, and *Schinia deserticola* enhanced the lure.

The rangers at the Goblin Valley State Park reported having a big rain event in October of 2006 and a good amount of winter rain and snow in 2007. When Mike and his wife Jennifer arrived in mid-May we found the desert covered with wildflowers, and plenty of BLM land outside the State Park to explore and collect. Goblin Valley is seldom visited, especially compared to Zion and Bryce Canyon to the west, and we enjoyed the lack of crowds. The campground included showers and campsites with cement slabs and a structure over them to shelter from wind, rain, and sun. The geology is fascinating and a photographer's paradise. The Entrada Sandstone of the area has been fractured and eroded to form the mushroom shaped features of the area that resemble goblins. The Valley of the Goblins is a two-mile hike from the campground.

The collecting was great, especially along Goblin Valley Road, where *Schinia biundulata* was very common at light, and even a couple of *S. sanrafaeli* specimens flew in. In the morning, several more were found on the flowers of the composite nakedstem bahia (*Platyschkuria integrifolia*). After sharing this with Chuck Harp (author of *S. sanrafaeli*), he expressed his belief that *S. sanrafaeli* was utilizing *Gaillardia*, which was another common roadside composite in Goblin Valley. A more thorough study of this moth may reveal one of these plants as its host.

For weeks during the summer, news was full of the epic storms and record rainfall for southern Texas - another flower moth hotspot known to be especially productive in October. Thus, we capped off our collecting season in the small town of Falfurrius, a couple of hours south of San Antonio, TX. The Falfurrius area is characterized by limestone bedrock with ancient marine sand terraces which support isolated patches of oak woodlands. There were large areas of *Heterotheca subaxillaris*, a composite utilized by a number of *Schinia* species. Acting on the advice of South Texas moth collectors Ed Knudson and Charles Bordelon, we concentrated our efforts about 10 miles south on Hwy 281 at the Brooks County Rest Area. Over the next couple days we used a number of collecting strategies including blacklight traps, mercury vapor lights, and even found some of the lights at the rest area to be productive. We were amazed at both the diversity and numbers of *Schinia* and were able to collect seventeen Heliiothinae species in this area with over a thousand specimens between us.

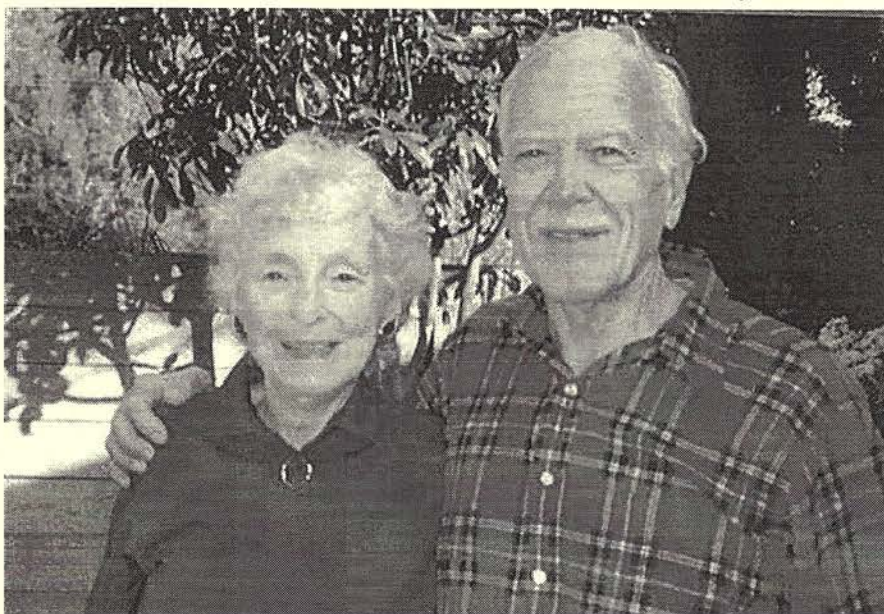
With the ample winter-spring rains of 2008, we anxiously await a productive new season. We expect to find rare heliothine species from various habitats ranging from 12,500 foot elevation of the White Mts., Mono County, to near sea level canyons of the Colorado Desert.



Passing of KENNETH W. and RUTH S. COOPER

First Ruth Cooper, then her husband Kenneth recently died (on January 8, 2005 and August 8, 2007 respectively). They were both class A biologists who did their graduate work at Columbia University, where they met and married. Ken had a rare intellect that examined all matters in an original and penetrating way, often with such gusto that it was like being subjected to a cavalry charge. Ruth, on the other hand, was calm and considered, with a quiet level-headedness equally effective in winning a point.

Ken, born in Flushing, NY on November 29, 1912, was from his youth an accomplished entomologist. Initially fond of beetles, Ken later acquired an intense interest in Hymenoptera (especially Megachilidae) and during his last years took up an interest in Hemiptera. Ken was an inaugural member and enthusiastic supporter of FERM.



In his academic career, Ken was a first-rate geneticist and cell biologist; with exceptionally high standards for himself, as well as for others. As a graduate student at Columbia, he chose Franz Schrader, a rigorous scholar in cell biology, as his doctoral mentor "because he was the only professor who would not give me an A in his course". Schrader in turn, following his own dictum that unusual cells reveal overlooked important features, urged Kenneth to study cell division in the eggs of a grass mite *Pediculopsis graminum*. Not fazed by the literature describing their sole habitat in Europe, Kenneth proceeded to find the mites in his own mother's back yard in Flushing. His doctoral thesis described their most unusual chromosomes and the fibers that led them apart in mitosis. Later, as an Associate Professor at Princeton, he would mentor only one student as PhD candidate.

Ruth, born Ruth Snyder on Long Island, NY on December 13, 1913, was also an accomplished biologist. She acquired a BA degree with very high honors from Barnard College in 1935 and an MA in 1937 and PhD in 1943 from Columbia University. She married Ken in 1937 and was content, as many women biologists of her generation were, to remain a research associate all her life. Yet before and after devoting her life to bringing up their children for nearly 18 years, she made original contributions in fields ranging from immunological embryology to cell biology.

After a brief stint at the University of Rochester, the Coopers arrived at Princeton in 1939, where Kenneth taught advanced courses in cytogenetics and cell biology. In the breaks during their 13 years at Princeton, the Coopers, together with Franz and Sally-Hughes Schrader and Francis Ryan (Ruth's PhD mentor) would head off to Panama and Costa Rica to observe and collect unusual insects. In 1944 and 1945 they took two half-year sabbaticals at Cal Tech where Kenneth was a John Simon Guggenheim Memorial Foundation Fellow. The summers of 1946 to 1948 were spent at the Woods Hole Marine Biological Laboratory.

In 1949 and 1950 Ken and Ruth adopted two very young babies, a boy, Geoff, and a girl, Tera. In 1952, the Coopers moved to the University of Rochester for the second time in their lives. They left Rochester for Gainesville, FL in 1957 to free their young son Geoff from strep throat, too common in Rochester. After two years at the University of Florida, where Ken was the first Distinguished Graduate Research Professor, they left Gainesville in order not to bring up their children in an area where the Ku Klux Klan was still burning crosses.

(Continued from page 6)

They headed north to Dartmouth, New Hampshire, where a Rockefeller Foundation panel had recommended the development of a basic science medical school. Ken helped to transform the Dartmouth Medical School curriculum from a 2-year to a full 4-year program. When the cold climate contributed to Ruth's suffering from ECHO virus infection and Reynaud's symptom, the Coopers left for warmer California. At UCR, Kenneth was appointed an over-grade Professor for 1967-1981, while Ruth became a Research Associate in Ken's lab and worked on mitosis in the grass mite, *Siteroptis graminum*. As emeritus Professor, Ken re-immersed himself until his death in his life-long love of entomology. The Coopers not only enjoyed their trips to the desert collecting wasps and beetles, but Ruth continued to take outstanding photographs of desert plants. In 1993, Kenneth named a rare and beautiful bee (*Holcopasites ruthae*), in Ruth's honor [See FERM Newsletter No. 28].

This tribute is an edited version (by G.R. Ballmer) of an obituary created by two of Ken and Ruth's dearest friends, John Tyler Bonner and Shinya Inoué.

Doi Dtung

by Greg Ballmer



As past readers of this newsletter may already know, I frequently visit the Kingdom of Thailand to sample its insects and gastronomical delights. During 2007 my visit coincided with the King's 80th birthday (Dec. 5th), as well as the 40-year anniversary reunion of my Peace Corps Volunteer Group XXI, which participated in Thailand's National Malaria Eradication Project during the late 1960s. I arrived two weeks prior to the planned social events in order to join J. F. Maxwell (Max), Curator of the Chiang Mai University (CMU) Herbarium, in a botanical expedition to the mountainous "Golden Triangle".

The King's late mother built a royal residence atop Doi Dtung, a part limestone, part granite mountain in the far north of Chiang Rai Province, bordering Burma. The Doi Dtung Foundation now maintains the former royal palace and surrounding gardens (open to the public) and sponsors economic development programs for the local hill tribes.

Local hill tribes grow cash crops such as coffee, corn, macadamia nuts, strawberries, tea, and vegetables instead of opium. Most of the native forest was previously destroyed by traditional slash-and-burn agriculture, resulting in heavy erosion and unsustainable loss of soil and nutrients. In the 1990s the Royal Forestry Department replanted the forest utilizing primarily one tree species (*Pinus kesiya*), which normally comprises less than 1% of the forest. This folly became apparent when the flammable monoculture resulted in extensive forest fires and ongoing erosion. Even worse, the pine provides little food value for insects, birds, and other animals, while build-up of pine needles alters the soil chemistry, inhibiting re-establishment of other tree species. Remedial reforestation is now in progress.

Max, a curmudgeonly misfit in the deferential Thai bureaucracy, works more effectively from the outside. Although frequently railing against the "cretinized dolts at the World Wank" who fund ill-conceived projects by incompetent "feather-duster _____s", Max is warmly regarded by officials of the Doi Dtung Foundation. In return for the opportunity to conduct botanical surveys of remnant forest on Doi Dtung, Max helps to collect and identify seeds for propagation and offers free advice on conservation and reforestation. On this trip Max escorted three female students from the CMU Pharmacology School to help them locate and collect plants for extraction and characterization of medicinal compounds. One such plant is known only from the limestone summit, while other similarly rare species were located through Max's intimate knowledge of Doi Dtung.

And what of the insects? November in northern Thailand is generally dry and cool – not the best season for lycaenid butterflies (my primary interest), which were uncommon. Most abundant were members of the genus *Miletus*, all of which are predators (in the larval stage) of homopterous insects. Workers at the Doi Dtung Foundation recommended that I come back during May or June (onset of the summer monsoon) when insect activity is far greater.

Theodore Fisher Family Endowment Fund

by Serguei V. Triapitsyn, Doug Yaqnega and John Heraty

Dr. Theodore (Ted) William Fisher, Specialist Emeritus, passed away at age 86 on September 12, 2006. During his UCR career in the Department of Entomology, he achieved international recognition as a systematist, natural historian and biological control researcher, with a general focus on the biology and taxonomy of sciomyzid flies and the biological control of their snail hosts. He was also a long-time supervisor of the former UCR Department/Division of Biological Control insectary and quarantine facility.



Ted Fisher was born on May 26, 1921, in Redwood City, CA, and attended high school in Redwood City. On graduation in 1939, he studied (until 1941) at San Mateo Junior College and from 1941 to 1943 at San Jose State College. Ted served in WWII as a field artillery cannoneer and staff sergeant, then for the U.S. government from 1945 to 1946. From 1946 to 1948, he studied economic entomology at UC Berkeley and received his Ph.D. degree from the UCR Department of Biological Control, in 1952. Dr. Fisher was employed by the former UCR Department/Division of Biological Control and then the Department of Entomology until his retirement in 1991.

During his distinguished research career, Dr. Fisher worked on many biological control projects, from the laboratory colonization of *Aphytis* species to the biology of several different groups of Aphelinidae, including *Coccobius*, *Coccophagus* and *Pteroptrix*. However, the turning point in his research came with his first publication on the biology of a snail-eating sciomyzid fly, *Antichaeta testacea*, in 1964. Together with UCR staff entomologist Robert E. Orth and others, Dr. Fisher published 17 publications on the taxonomy and biology of Sciomyzidae, including a revision of the Sciomyzidae of California (1983 *Bulletin of the California Insect Survey* 24: 1-117).

In 1985, he and Bob Orth summarized their successful research on the biological control of the brown snail *Helix aspera* by another snail, *Rumina decollata*, in a 111-page UCR publications monograph. Dr. Fisher published more than 60 publications on various topics of biology, taxonomy, biological control, and quarantine facilities.

Dr. Fisher continued to be active after retirement, often visiting the Department of Entomology and finally completing, with Dr. Thomas S. Bellows, the impressive *Handbook of Biological Control*, published by Academic Press, in 1999, to which he contributed a chapter on insect quarantine.

From the proceeds of their estate, Ted and his late wife, Elizabeth, made a wonderful bequest to the UCR Entomology Research Museum. In appreciation, and to remember the Fishers' generosity, the Department of Entomology has used this gift to establish the **Theodore Fisher Family Endowed Fund in Entomology**. This fund will enhance the museum's collection, and provide much-needed research, curatorial, and student support. FERM members who would like to contribute to this endowment fund are invited to do so. Your check should be made payable to the UC Riverside Foundation and mailed to the Department of Entomology or directly to the Foundation at P.O. Box 112, Riverside, CA 92502-9879. Please write the fund's name on the check's memo line.



photos by K. Osborne[©]

***Baptarma felicitata* Smith 1904 (Noctuidae)**
by Ken Osborne

Baptarma felicitata is a monotypic member of the Heliothine noctuids – a group of moths with generally very colorful adults. This little moth, which in terms of gaudy coloration arguably outshines all of its relatives, is considered to be very rare (and coveted by collectors). More accurately, it is only rare in collections, and ranges from western Texas across the southwestern deserts to California, in the driest canyons, washes, and slopes. In February or March, after ample winter-spring rains, when scorpionweed (*Phacelia crenulata*) is in flower, the adult moths emerge from their subterranean pupal chambers. The diurnal adults lay their eggs in the *Phacelia* flowers, where the cryptic larvae feed on the developing flowers and seeds. The moths rest by night (and on cool days) on the flowerheads – where their burgundy forewings with white marks provide crypsis among the purple *Phacelia* flowers. Active adults are hard to approach, as they fly away at the slightest sound of footfall.

After years of searching for this species in western Arizona, I finally discovered this moth to be abundant in association with *P. crenulata* along the rocky slopes west of Palm Springs, near Windy Point. After seeing a couple of adults in the daytime, I decided to search the host flowers at night by flashlight. Here, the moths were quickly found and easily photographed (as seen above).